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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

HARTMAN JR, RONALD D

ART UNIT

PAPER NUMBER

2121

DATE MAILED: 12/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

10/017,021

Applicant(s)

YUTKOWITZ, STEPHEN J.

Examiner

Ronald D Hartman Jr.

Art Unit

2121

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 October 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4, 6-9 and 11-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-9, 11-17, 19-20 is/are rejected.
- 7) ☒ Claim(s) 18 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-4, 6-9 and 11-20 are presented for further examination.

Response to Arguments

2. Applicant's arguments with respect to the rejections of claims 1-4, 6-9 and 11-20, based on the prior art, have been fully considered but are moot in view of the new ground(s) of rejection, as set forth below in this office action.

Applicant's arguments with respect to the pending 101 Rejection of claims 1-15 has been fully considered, but they are not viewed to be persuasive because the applicant's amendment to claim 1 does not overcome the outstanding 101 rejections of claims 1-15 since "automatically" merely means "acting or done spontaneously or unconsciously", as per Merriam Webster's Collegiate Dictionary, Tenth Edition, and therefore the inclusion of this "automatic" feature does not remedy the deficiencies under 101 since these functions may still be implemented or performed by an individual and therefore the rejection is maintained and has been once again provided below, but re-written using different wording, for the applicants convenience.

Claim Rejections - 35 USC § 101

3. Claims 1-15 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The claims are directed to a method and system *that does not require* computer implementation or the use of computer related technology to accomplish. The claims allow for the involvement of subjective human decision and therefore do not produce repeatable, concrete results.

Therefore, the language of the claims raises a question as to whether the claims are directed merely to an abstract idea that is not tied to a technological art, environment or machine which would result in a practical application producing a concrete, useful, and tangible result to form the basis of statutory subject matter under 35 U.S.C. 101.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 7, 13-14, 17 and 19-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Chaffee et al., U.S. Patent No. 5,684,375.

As per claims 1, 13 and 19-20, Chaffee et al teaches a method and system for auto-tuning a motion control system comprising:

- determining an initial value of a feed-forward compensation parameter (hereinafter: FFCP), commanding an initial (e.g. first) movement of an actuator according to a test routine, wherein the initial value of the parameter is used in the control of the actuator, determining an error associated with the first movement, determining a potential value of the FFCP, commanding a movement (e.g. second movement) of the actuator according to the test routine, wherein the potential value of the parameter is used in the control of the actuator, determining an error associated with the second movement, wherein at least two movements are used for making this determination (e.g. C2 L24-48).

Furthermore, as per claims 1, 13 and 19-20, comparing the errors associated with the movements and based on the comparison, selecting one of the values as the current best value, and repeating all of the aforementioned steps until the current best value is an optimum value are all features that are inherent to the prior art discussed by way of C2 L24-48 since in order to reduce the following error to an acceptable level, that is, below an acceptable threshold, as disclosed by C2 L39-41, Chaffee et al. *must* provide a means by which this determination takes place, and the only way of doing this

Art Unit: 2121

is through comparison to previous errors so as to gauge whether the current error is greater than or less than then previous error. Furthermore, selecting the current best value and repeating to optimize the feed-forward compensation parameter (e.g. gain) corresponds to Chaffee et al.'s disclosure of storing the *tuned* feed-forward parameters (e.g. gains) for the system so that *optimal* performance of the motion control system can be achieved (e.g. C2 L49-53).

Examiner's Note: It is worth noting that tuning feed-forward parameters (FFCP) for motion control systems has been known for quite some time, and dates back to the mid 70's. The applicant's claims 1, 13 and 19-20 have been interpreted to essentially claim:

- using an initial value for a FFCP (e.g. gain);
- moving an actuator using the FFCP to determine an error;
- changing FFCP to a different value and using this different value to move the actuator so as to determine the error associated with this movement;
and
- comparing the errors so that the optimal tuning constant (e.g. gain) may be chosen so as to minimize the error, thereby optimizing the motion control system through utilization of the aforementioned tuning steps.

This system is clearly anticipated by Chaffee et al. since Chaffee et al. teaches all of these steps being already being performed by the prior art, at the time of Chaffee's disclosed invention (See C2 L24-48).

As per claim 2, Chaffee et al. teaches the use of a plurality of feed-forward compensation parameters and using these parameters in the control of the actuator for the commanded movements (e.g. Figure 2 element 46, "P Gain"; element 50, "I gain"; and element 54, "F gain").

As per claim 3, Chaffee et al. teaches a feed-forward compensation parameter being comprise of a time-shift parameter (e.g. Figure 2 elements 52 and 54) and other feed-forward compensation parameters consisting of proportional gain and integral gain (e.g. Figure 2 element 46, "P Gain" and element 50, "I gain").

As per claim 7, Chaffee et al. teaches the use of following error (e.g. C2 L20-23 and C2 L39-41).

As per claims 14 and 19-20, the rejection of claim 1 is equally applied herein.

Furthermore, Chaffee teaches a position command generator, a feed-forward command generator, a controller, a feed-forward tuning unit and an actuator (e.g. Figures 1-3).

Furthermore, Chaffee's system adequately teaches feature(s) wherein a best value and a second best value are determined since the point of the combined system is to provide a means by which the system may be tuned (e.g. system gain tuning) and therefore the determination of best and second values is inherent since this is the point of tuning, that is, to provide closer and closer approximations for desired parameters by *iteratively* calculating the necessary system parameters for effectively and reliably tuning the control system.

As per claim 17, Chaffee teaches the position command generator, the feed-forward command generator and the feed-forward tuning unit being incorporated within a computer numerical control unit and the controller comprises a servo-controller (e.g. Figures 1-3).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chaffee et al., as applied to claim 1 above, in view of obviousness.

As per claim 4, although Chaffee et al does not specifically teach determining optimum values for a gain parameter *prior* to determining the optimum value for the time-shift parameter, it represents a function that the disclosed system of Chaffee et al. obviously would possess so that the system does not have to tune multiple loops concurrently which can require sufficient computational resources, and this would have been obvious to one of ordinary skill in the art at the time the invention was made.

Claims 6 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chaffee et al., as applied to claim 1 above, in view of Junk, U.S. Patent No. 6,128,541.

As per claim 6, Chaffee et al. does not specifically teach a sinusoidal test routine.

Junk teaches an auto-tuner for use in a process control network wherein a sinusoidal test signal is injected into the system in order to determine the response of the system (Abstract).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have incorporated the teachings of Junk into the system disclosed by Chaffee et al. since both inventions are related to analogous art, that is they are both directed to auto-tuning a process control system, and the inclusion of this feature would have been obvious at the time the invention was made for the purpose of properly exciting the system using a chosen gain, so that the output can be measured, with regards to output frequency components, so that the system may be accurately and effectively tuned, and this would have been obvious to one of ordinary skill in the art at the time the invention was made.

As per claim 9, Chaffee et al. does not specifically teach the determination of the potential compensation parameters being based on a minimization algorithm.

Junk teaches an auto-tuner for use in a process control network wherein the compensation parameters (e.g. gain) are determined by using the Nelder-Mead downhill simplex method and simulated annealing (e.g. C8 L48-62).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have incorporated the teachings of Junk into the system disclosed by Chaffee et al. since both inventions are related to analogous art, that is they are both directed to auto-tuning a process control system, and the inclusion of this feature would have been obvious at the time the invention was made for the purpose of providing a statistical method by which the local or global optimal gain sets may be effectively and accurately determined, thereby forming a more reliable means of tuning a control system, and this would have been obvious to one of ordinary skill in the art at the time the invention was made.

Claims 8 and 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chaffee et al., as applied to claim 1 above, in view of Patel et al., U.S. Patent No. 6,631,299.

As per claims 8 and 11, Chaffee does not specifically teach the comparison of errors to involve comparing an average of the root means squared value of each of the errors, not the use of a percentage error (Examiner's Note: The examiner has interpreted this feature to essentially disclose the use of a statistical term called "variance" since "variance" is a measure of how "spread out a distribution" is and it is computed as the *average squared deviation of each value from its mean*).

Patel et al. teaches a system and method for self-tuning a control system wherein the mean square error is determined as well as the percentage error for each tuning run or step (e.g. Figures 7A and 9).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have incorporated the teachings of Patel et al. into the system disclosed by Chaffee for the purpose of providing very accurate error determinations so

Art Unit: 2121

that the control system may be effectively tuned by reducing the performance penalty for incorrectly estimating system gain, and this would have been obvious to one of ordinary skill in the art at the time the invention was made.

Furthermore, as per claims 11-12, Chaffee's combined system (Chaffee in view of Patel et al.) adequately teaches feature(s) wherein a best value and a second best value are determined since the point of the combined system is to provide a means by which the system may be tuned (e.g. system gain tuning) and therefore the determination of best and second values is inherent since this is the point of tuning, that is, to provide closer and closer approximations for desired parameters by *iteratively* calculating the necessary system parameters for effectively and reliably tuning the control system.

Claims 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chaffee et al., as applied to claim 14 above, in view of Blevins et al., U.S. Patent No. 6,445,962.

As per claims 15-16, Chaffee et al. does not specifically teach the use of a communications protocol that is HTTP so as to allow the feed-forward tuning unit the ability to communicate remotely with an actuator.

Blevins et al. teaches the use of a data communications network using hypertext transfer communications protocol (HTTP) for the purpose of sending the tuning software to a remote location through the use of the Internet (e.g. C17 L39-52).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have incorporated the teachings of Blevins et al. into Chaffee so as to provide a simple means by which the tuning of the control system may occur regardless of the geographical location of the tuning system, and this would have been obvious to one of ordinary skill in the art at the time the invention was made.

Allowable Subject Matter

6. Claim 18 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

As per claim 18, the prior art of record fails to teach or adequately suggest a feed-forward tuning unit utilizing a finite state machine, in combination with the other claimed features and or limitations as claimed.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ronald D Hartman Jr. whose telephone number is (571) 272 - 3684. The examiner can normally be reached on Mon. - Fri., 10:00 am - 6:30 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anthony Knight can be reached at (571) 272 - 3687. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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